

BUILDING SITE DEVELOPMENT
Johnson County, Kansas

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. These tables show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. Not limited indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. Slightly limited indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. Very limited indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

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Map symbol and soil name	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CA: Chase-----	90	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Shrink-swell Depth to saturated zone	1.00 1.00 0.95	Very limited Flooding Shrink-swell	1.00 1.00
EA: Eudora-----	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
EB: Eudora-----	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
EC: Eudora-----	60	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Kimo-----	30	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00
		Depth to saturated zone	0.39			Depth to saturated zone	0.39
ED: Eudora-----	75	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
Kimo-----	25	Very limited Flooding	1.00	Very limited Flooding Depth to saturated zone	1.00 0.61	Very limited Flooding	1.00
GA: Grundy-----	100	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00
KA: Kennebec-----	95	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 0.82 0.50	Very limited Flooding Shrink-swell	1.00 0.50
KB: Kennebec-----	90	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 0.61 0.50	Very limited Flooding Shrink-swell	1.00 0.50
KC: Kimo-----	90	Very limited Flooding Shrink-swell	1.00 1.00	Very limited Flooding Depth to saturated zone	1.00 1.00	Very limited Flooding Shrink-swell	1.00 1.00
		Depth to saturated zone	0.39			Depth to saturated zone	0.39
LA: Ladoga-----	90	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope Shrink-swell	0.50 0.50
LB: Ladoga-----	85	Somewhat limited Slope Shrink-swell	0.63 0.50	Somewhat limited Slope Shrink-swell	0.63 0.50	Very limited Slope Shrink-swell	1.00 0.50
MA: Martin-----	90	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
MB: Martin-----	45	Very limited Shrink-swell Slope	1.00 0.04	Very limited Shrink-swell Slope	1.00 0.04	Very limited Shrink-swell Slope	1.00 1.00
Vinland-----	40	Somewhat limited Depth to soft bedrock Slope	1.00 0.63	Very limited Depth to soft bedrock Slope	1.00 0.63	Very limited Slope Depth to soft bedrock	1.00 1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
MC: Morrell-----	85	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope Shrink-swell	0.50 0.50

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Map symbol and soil name	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
OA: Orthents-----	100	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00	Very limited Shrink-swell	1.00
OB: Oska-----	88	Very limited Shrink-swell Depth to hard bedrock	1.00 0.01	Very limited Shrink-swell Depth to hard bedrock	1.00 1.00	Very limited Shrink-swell Slope Depth to hard bedrock	1.00 0.12 0.01
OC: Oska-----	50	Very limited Shrink-swell Depth to hard bedrock	1.00 0.29	Very limited Shrink-swell Depth to hard bedrock	1.00 1.00	Very limited Shrink-swell Slope Depth to hard bedrock	1.00 0.50 0.29
Martin-----	30	Very limited Shrink-swell Depth to saturated zone	1.00 0.44	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell Slope Depth to saturated zone	1.00 0.50 0.44
PA: Pawnee-----	85	Very limited Shrink-swell Depth to saturated zone	1.00 0.39	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Shrink-swell Depth to saturated zone Slope	1.00 0.39 0.12
PC: Polo-----	100	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50
QA: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
RA: Reading-----	90	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50	Very limited Flooding Shrink-swell	1.00 0.50
SA: Sharpsburg-----	85	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope Shrink-swell	0.50 0.50
SB: Sharpsburg-----	55	Somewhat limited Shrink-swell	0.50	Somewhat limited Shrink-swell	0.50	Somewhat limited Slope Shrink-swell	0.50 0.50
Urban Land-----	45	Not Rated Not Rated; Slope Not Rated; Fragments > 75mm		Not Rated Not Rated; Slope Not Rated; Unified Not Rated; Fragments > 75mm		Not Rated Not Rated; Slope Not Rated; Fragments > 75mm	
SC: Sibleyville-----	100	Not limited		Somewhat limited Depth to soft bedrock	0.54	Somewhat limited Slope	0.12
SD: Sibleyville-----	45	Not limited		Somewhat limited Depth to soft bedrock	0.54	Somewhat limited Slope	0.12
Vinland-----	35	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock Slope	1.00 0.12

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Map symbol and soil name	Pct of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
SE: Sogn-----	55	Very limited Depth to hard bedrock Shrink-swell Slope	1.00 0.50 0.16	Very limited Depth to hard bedrock Shrink-swell Slope	1.00 0.50 0.16	Very limited Depth to hard bedrock Slope Shrink-swell	1.00 1.00 0.50
Vinland-----	30	Somewhat limited Depth to soft bedrock Slope Shrink-swell	1.00 0.84 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 0.84 0.50	Very limited Depth to soft bedrock Slope Shrink-swell	1.00 1.00 0.50
VA: Rock Outcrop-----	60	Not rated		Not rated		Not rated	
Vinland-----	26	Very limited Slope Depth to soft bedrock Shrink-swell	1.00 1.00 0.50	Very limited Slope Depth to soft bedrock Shrink-swell	1.00 1.00 0.50	Very limited Slope Depth to soft bedrock Shrink-swell	1.00 1.00 0.50
WA: Wabash-----	88	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00	Very limited Flooding Depth to saturated zone Shrink-swell	1.00 1.00 1.00
WB: Woodson-----	100	Very limited Shrink-swell Depth to saturated zone	1.00 1.00	Very limited Depth to saturated zone Shrink-swell	1.00 1.00	Very limited Shrink-swell Depth to saturated zone	1.00 1.00

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Map symbol and soil name	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
CA: Chase-----	90	Not Rated Not Rated; AASHTO GIN Frost action Flooding Shrink-swell	 1.00 1.00 1.00	Somewhat limited Depth to saturated zone Flooding Too clayey Cutbanks cave	 0.95 0.60 0.12 0.10	Somewhat limited Flooding	0.60
EA: Eudora-----	90	Not Rated Not Rated; AASHTO GIN Frost action Flooding	 1.00 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
EB: Eudora-----	85	Not Rated Not Rated; AASHTO GIN Frost action Flooding	 1.00 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
EC: Eudora-----	60	Not Rated Not Rated; AASHTO GIN Frost action Flooding	 1.00 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
Kimo-----	30	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell Flooding Depth to saturated zone	 1.00 1.00 0.40 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	 1.00 0.12 0.10	Somewhat limited Depth to saturated zone	0.19
ED: Eudora-----	75	Not Rated Not Rated; AASHTO GIN Frost action Flooding	 1.00 0.40	Somewhat limited Cutbanks cave	0.10	Not limited	
Kimo-----	25	Not Rated Not Rated; AASHTO GIN Frost action Flooding	 1.00 0.40	Somewhat limited Depth to saturated zone Cutbanks cave Too clayey	 0.61 0.10 0.03	Not limited	
GA: Grundy-----	100	Not Rated Not Rated; AASHTO GIN Depth to saturated zone Frost action Shrink-swell	 1.00 1.00 1.00 1.00	Very limited Depth to saturated zone Too clayey Cutbanks cave	 1.00 0.12 0.10	Very limited Depth to saturated zone	1.00
KA: Kennebec-----	95	Very limited Frost action Flooding Low strength Shrink-swell	 1.00 1.00 1.00 0.50	Somewhat limited Depth to saturated zone Flooding Cutbanks cave	 0.82 0.60 0.10	Somewhat limited Flooding	0.60
KB: Kennebec-----	90	Not Rated Not Rated; AASHTO GIN Frost action Flooding Shrink-swell	 1.00 1.00 0.50	Somewhat limited Flooding Depth to saturated zone Cutbanks cave	 0.80 0.61 0.10	Very limited Flooding	1.00
KC: Kimo-----	90	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell Flooding Depth to saturated zone	 1.00 1.00 0.40 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	 1.00 0.12 0.10	Somewhat limited Depth to saturated zone	0.19

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Map symbol and soil name	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
LA: Ladoga-----	90	Not Rated Not Rated; AASHTO GIN Shrink-swell Frost action	0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
LB: Ladoga-----	85	Not Rated Not Rated; AASHTO GIN Slope Shrink-swell Frost action	0.63 0.50 0.50	Somewhat limited Slope Cutbanks cave	0.63 0.10	Somewhat limited Slope	0.63
MA: Martin-----	90	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell	1.00 1.00	Somewhat limited Too clayey Cutbanks cave	0.32 0.10	Not limited	
MB: Martin-----	45	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell Slope	1.00 1.00 0.04	Somewhat limited Too clayey Cutbanks cave Slope	0.28 0.10 0.04	Somewhat limited Slope	0.04
Vinland-----	40	Not Rated Not Rated; AASHTO GIN Depth to soft bedrock Slope Shrink-swell Frost action	1.00 1.00 0.63 0.50 0.50	Very limited Depth to soft bedrock Slope Cutbanks cave	1.00 0.63 0.10	Very limited Depth to bedrock Slope	1.00 0.63
MC: Morrill-----	85	Not Rated Not Rated; AASHTO GIN Shrink-swell Frost action	0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
OA: Orthents-----	100	Not Rated Not Rated; AASHTO GIN Shrink-swell	1.00	Not Rated Not Rated; Taxonomic or texture class Too clayey	0.28	Not Rated Not Rated; Taxonomic Great Group	
OB: Oska-----	88	Not Rated Not Rated; AASHTO GIN Shrink-swell Frost action Depth to hard bedrock	1.00 0.50 0.01	Very limited Depth to hard bedrock Too clayey Cutbanks cave	1.00 0.41 0.10	Somewhat limited Depth to bedrock	0.01
OC: Oska-----	50	Not Rated Not Rated; AASHTO GIN Shrink-swell Frost action Depth to hard bedrock	1.00 0.50 0.29	Very limited Depth to hard bedrock Too clayey Cutbanks cave	1.00 0.32 0.10	Somewhat limited Depth to bedrock	0.29
Martin-----	30	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.22	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.32 0.10	Somewhat limited Depth to saturated zone	0.22
PA: Pawnee-----	85	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell Depth to saturated zone	1.00 1.00 0.19	Very limited Depth to saturated zone Too clayey Cutbanks cave	1.00 0.12 0.10	Somewhat limited Depth to saturated zone	0.19

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Map symbol and soil name	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
PC: Polo-----	100	Not Rated Not Rated; AASHTO GIN Shrink-swell Frost action	0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
QA: Pits, Quarries-----	100	Not rated		Not rated		Not rated	
RA: Reading-----	90	Very limited Frost action Low strength Shrink-swell Flooding	1.00 1.00 0.50 0.40	Somewhat limited Cutbanks cave Too clayey	0.10 0.02	Not limited	
SA: Sharpsburg-----	85	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
SB: Sharpsburg-----	55	Not Rated Not Rated; AASHTO GIN Frost action Shrink-swell	1.00 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
Urban Land-----	45	Not Rated Not Rated; Fragments > 75mm Not Rated; Slope Not Rated; AASHTO GIN		Not Rated Not Rated; Fragments > 75mm Not Rated; Slope Not Rated; Taxonomic or texture class		Not Rated Not Rated; Surface clay percent Not Rated; Slope Not Rated; Surface Fragments > 75mm Not Rated; Sieve size, 3 to 10", > 10" Not Rated; pH	
SC: Sibleyville-----	100	Not Rated Not Rated; AASHTO GIN Frost action	0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	0.54 0.10	Somewhat limited Depth to bedrock	0.54
SD: Sibleyville-----	45	Not Rated Not Rated; AASHTO GIN Frost action	0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	0.54 0.10	Somewhat limited Depth to bedrock	0.54
Vinland-----	35	Not Rated Not Rated; AASHTO GIN Depth to soft bedrock Frost action	1.00 0.50	Very limited Depth to soft bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock	1.00
SE: Sogn-----	55	Not Rated Not Rated; AASHTO GIN Depth to hard bedrock Shrink-swell Frost action	1.00 0.50 0.50	Very limited Depth to hard bedrock Slope Cutbanks cave	1.00 0.16 0.10	Very limited Depth to bedrock Droughty Slope Content of large stones	1.00 0.80 0.16 0.00
Vinland-----	30	Slope Not Rated Not Rated; AASHTO GIN Depth to soft bedrock Slope Shrink-swell Frost action	0.16 1.00 0.84 0.50 0.50	Very limited Depth to soft bedrock Slope Cutbanks cave	1.00 0.84 0.10	Very limited Depth to bedrock Slope Droughty	1.00 0.84 0.09

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Map symbol and soil name	Pct of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
VA: Rock Outcrop-----	60	Not rated		Not rated		Not rated	
Vinland-----	26	Not Rated Not Rated; AASHTO GIN Slope Depth to soft bedrock Shrink-swell Frost action	 1.00 1.00 0.50 0.50	Very limited Depth to soft bedrock Slope Cutbanks cave	 1.00 1.00 0.10	Very limited Depth to bedrock Slope Droughty	 1.00 1.00 0.11
WA: Wabash-----	88	Not Rated Not Rated; AASHTO GIN Shrink-swell Depth to saturated zone Flooding Frost action	 1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Flooding Too clayey Cutbanks cave	 1.00 0.60 0.50 0.10	Very limited Depth to saturated zone Flooding	 1.00 0.60
WB: Woodson-----	100	Not Rated Not Rated; AASHTO GIN Shrink-swell Depth to saturated zone	 1.00 0.94	Very limited Depth to saturated zone Too clayey Cutbanks cave	 1.00 0.50 0.10	Somewhat limited Depth to saturated zone	 0.94

